AMENDMENTS TO THE CLAIMS

1-133. Canceled

134. (New) A method of analysis of a geometric surface, the method comprising:

determining a conformal structure of a mesh representation of the surface; and

using the conformal structure to conformally map the surface representation to a canonical parameter domain.

135. (New) The method of claim 134, wherein determining the conformal structure includes, if the surface is open, transforming a representation corresponding to the open surface into a representation corresponding to a closed surface.

136. (New) The method of claim 135, wherein the representation corresponding to the open surface is a mesh M_o, and transforming the representation comprises doubling the mesh M_o to form a doubled mesh $\overline{M}_o$.

137. (New) The method of claim 136, wherein doubling the mesh M_o to form the doubled mesh $\overline{M}_o$ comprises:

forming a second mesh $-M_o$ as the mesh M_o reversely oriented;

finding for each boundary vertex u on the boundary of M_o, represented as ∂M_o, a unique corresponding boundary vertex –u on the boundary of $-M_o$, represented as ∂-M_o;

finding for each boundary edge e on the boundary ∂M_o a unique corresponding boundary edge –e on the boundary ∂-M_o; and

gluing the mesh M_o and the second mesh $-M_o$, such that the corresponding vertices and edges of M_o and $-M_o$ are aligned, whereby the resulting mesh is the doubled mesh.

138. (New) The method of claim 134, wherein determining the conformal structure includes determining a holomorphic 1-form basis of a mesh representation M_c of the surface if the surface is closed or a mesh representation M_o of the surface if the surface is open.

139. (New) The method of claim 138, wherein determining the holomorphic 1-form basis includes determining a harmonic 1-form basis of the mesh representation M_c of the surface if the surface is closed or a doubled mesh representation $\overline{M}_o$ of the surface if the surface is open.

140. (New) The method of claim 139, wherein determining the harmonic 1-form basis includes determining a cohomology basis of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_o$ of the surface if the surface is open.

141. (New) The method of claim 140, wherein determining the cohomology basis includes generating a fundamental domain D_M of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_o$ of the surface if the surface is open, wherein the fundamental domain is a topological disk covering the surface once.

142. (New) The method of claim 139, wherein determining the harmonic 1-form basis includes determining a homology basis of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_o$ of the surface if the surface is open.

143. (New) The method of claim 142, wherein determining the homology basis includes generating a fundamental domain D_M of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_o$ of the surface if the surface is open, wherein the fundamental domain is a topological disk covering the surface once.

144. (New) The method of claim 142, wherein determining the homology basis includes generating 1-dimensional and 2-dimensional boundary matrices of the mesh representation M_c of

the surface if the surface is closed or the doubled mesh representation $\overline{M}_0$ of the surface if the surface is open.

145. (New) The method of claim 134, wherein determining the conformal structure includes generating a fundamental domain D_M of a mesh representation M_c of the surface if the surface is closed or a doubled mesh representation $\overline{M}_0$ of the surface if the surface is open, , wherein the fundamental domain is a topological disk covering the surface once.

146. (New) The method of claim 145, wherein determining the conformal structure further includes determining a homology basis of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_0$ of the surface if the surface is open.

147. (New) The method of claim 134, wherein determining the conformal structure includes generating 1-dimensional and 2-dimensional boundary matrices of a mesh representation M_c of the surface if the surface is closed or a doubled mesh representation $\overline{M}_0$ of the surface if the surface is open.

148. (New) The method of claim 147, wherein determining the conformal structure further includes determining a homology basis of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_0$ of the surface if the surface is open.

149. (New) The method of claim 148, wherein determining the conformal structure further includes determining a harmonic 1-form basis of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_0$ of the surface if the surface is open.

150. (New) The method of claim 149, wherein determining the conformal structure further includes determining a holomorphic 1-form basis of the mesh representation M_c of the surface if the surface is closed or the mesh representation M_0 of the surface if the surface is open.

151. (New) The method of claim 145, wherein determining the conformal structure further includes determining a cohomology basis of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_o$ of the surface if the surface is open.

152. (New) The method of claim 151, wherein determining the conformal structure further includes determining a harmonic 1-form basis of the mesh representation M_c of the surface if the surface is closed or the doubled mesh representation $\overline{M}_o$ of the surface if the surface is open.

153. (New) The method of claim 152, wherein determining the conformal structure further includes determining a holomorphic 1-form basis of the mesh representation M_c of the surface if the surface is closed or the mesh representation M_o of the surface if the surface is open.

154. The method of claim 134, wherein determining the conformal structure includes determining a period matrix of the surface from the surface representation, wherein the period matrix is a complete invariant of the conformal structure.

155. (New) The method of claim 134, wherein the surface is a closed, genus zero surface, and wherein the canonical parameter domain is a sphere.

156. (New) The method of claim 134, wherein the surface is an open, genus zero surface with a single boundary, referred to as a topological disk, and wherein the canonical parameter domain is a canonical planar disk.

157. (New) The method of claim 134, wherein using the conformal structure to conformally map the surface representation to the canonical parameter domain includes integrating a holomorphic 1-form of the surface representation.

158. (New) The method of claim 134, wherein the surface is an open, genus zero surface with a plurality of boundaries, and wherein the canonical parameter domain is a Euclidian plane.

159. (New) The method of claim 134, wherein the surface is a surface having genus greater than zero, and wherein the canonical parameter domain is a Euclidean plane.